FACE INVESTIGATION

SUBJECT: Maintenance machinist trainee entangled in revolving shaft of vertical boring mill

SUMMARY:
A 22-year-old male maintenance machinist trainee (the victim) died after becoming entangled in a rotating shaft of a vertical boring mill. He was working in a 32-inch deep concrete machine pit that contained the boring machine, next to an unguarded rotating shaft that extended vertically 9 feet from a baseplate on the pit floor to the upper portion of the machine. The shaft was 16 inches from the machine frame and 16 inches from the pit wall, and rotated 3-4 times a minute. The sleeve of the victim's jacket was caught and pulled by the shaft and he was whirled around the shaft. A co-worker heard the victim yell, turned in his direction, and saw him caught on the shaft. The co-worker ran to the control panel, hit the emergency stop button, and left to call 911. Another co-worker ran to the victim and attempted to suspend his body until rescue workers arrived. He was transported to the emergency room, where he was pronounced dead. The FACE investigator concluded that, to prevent similar occurrences, employers should:

- **enclose/guard mechanical power-transmission equipment (e.g., vertical drive shafts), where the potential exists for an employee to become entangled or caught in the equipment.**

- **develop, implement and enforce a written safety program that includes, but is not limited to, worker training in hazard identification, avoidance and abatement.**

- **designate a competent person to conduct regular safety inspections.**

INTRODUCTION:
On December 7, 1994, a 22-year-old male maintenance mechanic trainee died after becoming entangled in the rotating shaft of a vertical boring mill. The Wisconsin FACE investigator was notified by the Wisconsin Department of Labor and Human Relations, Workers Compensation Division, on December 8, 1994. On April 11, 1995, The WI FACE field investigator investigated the incident. A visit was made to the site of the incident, and the company supervisor was interviewed. The investigator obtained copies of the death certificate, police and medical examiner's reports, and OSHA reports. Photographs of the site taken immediately following the incident were obtained during the investigation.

The employer was a mining and tunneling equipment manufacturer that had been in business for 15 years. The company employed eight workers, three of whom were working at the time of the incident. The employer did not have a written safety program, but the supervisor reportedly conducted safety talks. New employees received on-the-job training in their assigned tasks, and worked side-by-side with experienced workers. This incident was the first fatality the company had experienced. The victim had been employed by the company for four months, and had received on-the-job training for the tasks he performed.

INVESTIGATION:
On the day of the incident, the company was running a milling machine to bore die cast metals. The machine was

approximately 24 feet long and 20 feet high, and was in a 32-inch deep concrete pit. (See Figure 1.) A 12-foot wide mill turntable was positioned between two 5-foot long, 12 feet high rectangular steel pillars that held the upper portion of the machine. An unguarded 2 ½ inch diameter metal shaft extended vertically 9 feet from a baseplate on the pit floor to the upper portion of the machine. The shaft was positioned 16 inches from the pillar and rotated 3-4 times a minute. A half-inch wide smooth keyway extended the entire length of the shaft. The machine control panel that held the emergency stop button in front of the turntable, approximately 20 feet from the rotating shaft.

The victim and a co-worker were drilling holes in the perimeter walls of the machine pit to install a platform floor over the pit. The co-worker left the area to answer the telephone, after telling the victim to shut the machine off and wait. The victim was positioned in the pit beside the rotating shaft when the sleeve of his jacket was caught and pulled by the shaft. He was whirled several times around the shaft, striking his body against the machine pillar and the pit wall. A second co-worker who was working about 40 feet away heard the victim yell, turned in his direction, and saw him caught on the shaft. The co-worker ran to the control panel, hit the emergency stop button, and went to call 911. The first co-worker ran to the victim and attempted to suspend his body until rescue workers arrived. He was transported to the emergency room, where he was pronounced dead. An autopsy was conducted, and tests were done for drugs and alcohol.

CAUSE OF DEATH:
The medical examiner listed the cause of death as crushing chest injuries. Body fluid samples did not detect alcohol or other drugs.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should enclose/guard mechanical power-transmission equipment (e.g., vertical drive shafts), where the potential exists for an employee to become entangled or caught in the equipment.

Discussion: The victim was working in proximity to an unguarded rotating vertical drive shaft when he became entangled and crushed against the machine's frame. Exposed mechanical power-transmission equipment poses a serious hazard to employees and all such equipment should be identified throughout the plant and appropriate enclosures/guards installed to prevent inadvertent contact with the equipment. OSHA standard 29 CFR 1910.212(a)(1) requires machine guarding to protect employees from the hazard of rotating parts. A machine guard enclosing the shaft would have prevented inadvertent contact with the revolving part.
Note: the one shaft involved in the incident has been enclosed subsequent to the incident.

Recommendation #2: Employers should develop, implement and enforce a written safety

program that includes, but is not limited to, worker training in hazard identification, avoidance and abatement.

Discussion: The victim was entangled in a vertical drive shaft and crushed between the shaft and the milling machine's frame while performing tasks around the unguarded drive shaft. Employers should evaluate tasks performed by workers; identify all hazards; and then develop, implement, and enforce written safe work procedures addressing these issues. Although general safety procedures were reportedly used, no specific procedures existed for the task that was being performed by the victim. The safety program should include at a minimum, worker training in hazard identification, and the avoidance and abatement of these hazards. Workers should receive formal safety training pertinent to their work on a periodic basis. An effective training program includes a written job description containing step-by-step procedures, a list of the hazards within each step of the procedures, and an explanation of ways to overcome these hazards. Periodic safety training will increase employees' awareness of the hazards confronting them.

Recommendation#3: Employers should designate a competent person to conduct regular safety inspections.

Discussion: Conducting regular safety inspections of all tasks by a competent person[1] will help ensure that established company safety procedures are being followed. Additionally, scheduled and unscheduled safety inspections of employee work sites clearly demonstrate that the employer is committed to the safety program and to the prevention of occupational injury.

REFERENCES

29 CFR 1910.212(a)(1) Code of Federal Regulations, U.S. Government Printing Office, Office of the Federal Register.

[1]Competent person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authority to take prompt corrective measures to eliminate them.

FIGURE 1